DOE/ID-11325
Revision 0

U.S. Department of Energy
Idaho Operations Office

HWMA/RCRA Closure Plan for the CPP-601 Waste Transfer Lines to the Tank Farm Facility

Voluntary Consent Order SITE-TANK-005 Action Plan Tank System INTEC-601

March 2008

Idaho Cleanup Project

DOE/ID-11325
Revision 0

HWMA/RCRA Closure Plan for the CPP-601 Waste Transfer Lines to the Tank Farm Facility

Voluntary Consent Order SITE-TANK-005 Action Plan Tank System INTEC-601

March 2008

Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office

ABSTRACT

This Hazardous Waste Management Act/Resource Conservation and Recovery Act closure plan for the waste transfer lines from the Fuel Process Building (CPP-601) to the Tank Farm Facility located at the Idaho Nuclear Technology and Engineering Center (INTEC), Idaho National Laboratory Site was developed to fulfill a milestone established under the Voluntary Consent Order SITE-TANK-005 Action Plan for tank system INTEC-601. The system to be closed consists of inactive waste lines used to transfer hazardous waste solutions from the Fuel Process Building to the Tank Farm Facility. The piping will be closed in accordance with the interim status tank system requirements of the Hazardous Waste Management Act/Resource Conservation and Recovery Act as implemented by IDAPA 58.01.05.009 and 40 CFR 265. This closure plan presents the closure performance standards for clean closure and describes the methods that will be used to achieve those standards.

CONTENTS

FIGURES

TABLES

ACRONYMS

AL	action level
CFR	Code of Federal Register
COC	constituent of concern
DEQ	State of Idaho Department of Environmental Quality
DOE	U.S. Department of Energy
EDF	engineering design file
EPA	U.S. Environmental Protection Agency
FAST	Fluorinel Dissolution Process and Fuel Storage (facility)
FDP	fluorinel dissolution process
HWMA	Hazardous Waste Management Act
HWN	hazardous waste number
ICP	Idaho Cleanup Project
ILWMS	INTEC Liquid Waste Management System
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
PEWE	Process Equipment Waste Evaporator
PTV	product transfer vessel
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
TCLP	toxicity characteristic leaching procedure
TFF	Tank Farm Facility
VCO	Voluntary Consent Order

HWMA/RCRA Closure Plan for the CPP-601 Waste Transfer Lines to the Tank Farm Facility

Voluntary Consent Order SITE-TANK-005 Action Plan Tank System INTEC-601

1. INTRODUCTION

This Hazardous Waste Management Act (HWMA) (State of Idaho 1983)/Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq. 1976) closure plan has been prepared for inactive waste transfer lines that were used to transfer hazardous waste solutions from the Idaho Nuclear Technology and Engineering Center (INTEC) Fuel Process Building (CPP-601) to the Tank Farm Facility (TFF) located at the Idaho National Laboratory (INL) Site. These waste transfer lines are part of the Voluntary Consent Order (VCO) SITE-TANK-005 tank system INTEC-601 and were addressed in the VCO system identification (INEEL 2002) and characterization documentation (EDF-4046).

In accordance with a milestone established under the VCO Action Plan, the waste transfer lines will be clean closed in accordance with the interim status tank system closure performance standards of IDAPA 58.01.05.009 [40 CFR 265.111 and 265.197(a)[a]]. Clean closure is the removal of all hazardous waste and the decontamination of all waste residues to meet site-specific performance standards. The INTEC-601 waste transfer lines contain mixed waste (both radioactive and hazardous waste). This closure plan addresses the hazardous waste constituents only. The U.S. Department of Energy (DOE) will address residual radioactive contamination as appropriate under a separate regulatory authority.

This closure plan presents a description and operational history of VCO SITE-TANK-005 tank system INTEC-601 and the waste transfer lines to be closed. The maximum hazardous waste inventories are identified along with the applicable U.S. Environmental Protection Agency (EPA) hazardous waste numbers (HWNs). The waste transfer lines will be closed by decontamination until site-specific action levels (ALs) specified in this closure plan have been achieved. Upon completion of the activities specified in this closure plan, the waste transfer lines will be certified as closed in accordance with the requirements of IDAPA 58.01.05.009 (40 CFR 265, Subparts G and J).

a. There are no tanks to be closed in this closure plan for the CPP-601 waste transfer lines to the TFF; however, the piping was identified during characterization as ancillary tank system equipment and, as such, 40 CFR 265.197 is applicable.

2. FACILITY DESCRIPTION

The INL Site encompasses approximately 890 mi^2 on the Eastern Snake River Plain in southeastern Idaho, west of Idaho Falls. Within the laboratory complex are eight major applied engineering, interim storage, and research and development facilities. Established in 1949 as the National Reactor Testing Station, the INL continues to safely build, test, and operate various types of nuclear reactor facilities for the United States Government. The Idaho Cleanup Project (ICP) is tasked with environmental cleanup, remediation, and decontamination and demolition activities at the INL.

The INTEC facility is situated on the south-central portion of the INL Site (Figure 1) and occupies an enclosed and secured area of approximately 0.39 mi^2. Work at INTEC includes receiving and storing spent nuclear fuel; environmental restoration; deactivation, decontamination and decommissioning activities; and mixed waste treatment.

Figure 1. Map of the INL Site showing the location of INTEC.

The uranium dissolution and extraction process located in the Fuel Process Building (CPP-601) began operation in 1954 and was designed to recover uranium from spent nuclear fuels using acid dissolution followed by a liquid-liquid extraction of the uranium. The uranium was purified through these

processes to a solid granular uranium trioxide ready for repackaging and transfer. The process consisted of three extraction cycles: first, second, and third. Process solutions containing recoverable amounts of uranium were collected and stored for additional uranium recovery while remaining aqueous raffinate solutions (referred to as first-cycle, second-cycle, and third-cycle raffinates) were discharged to the TFF as waste solutions following uranium accountability analyses. Additional information regarding the uranium dissolution and extraction process can be found in the *Voluntary Consent Order SITE-TANK-005 Combined System Identification and Characterization for the Uranium Dissolution and Extraction Process at the Idaho Nuclear Technology and Engineering Center* (INEEL 2002).

Piping within the uranium dissolution and extraction process was pitched to drain to low points and back to vessels in the process. At the end of each processing campaign, an extensive sweep down of the system was conducted for uranium accountability. Sweep downs were flushes of the system (including tanks and ancillary equipment) to recover any residual uranium that may have remained within the process. The sweep downs were carried out following standard radiological and industrial practices and were designed to flush all system components of process/product solution. The uranium sweep down flushes used either acids followed by water rinses or high pressure steam to recover residual uranium.

The reprocessing mission for CPP-601 was terminated in April 1992. At that time, the plant was preparing for a new aluminum fuel dissolution campaign and the first-cycle extraction systems were involved in maintenance and construction. When the last first-cycle processing campaign for FDP fuel terminated in 1988, the first-cycle process equipment was flushed to ensure uranium accountability. These systems, including those lines in the G- and U-Cells, were then extensively chemically decontaminated to prepare for worker access to the process cells.

Following completion of the last second- and third-cycle processing campaigns, and when it was decided that remaining process systems would not be used again, a final series of flushes, which included one dilute nitric and three water rinses, was completed. The last rinse was collected (multiple units and associated piping combined) and sampled. The resulting data were compared to RCRA toxicity characteristic limits to ensure that no RCRA-hazardous waste was left in the system. These procedures worked well for the process equipment, but not all waste transfer lines that discharged directly to the TFF were included in the flushing activities. Therefore, this closure plan has been prepared to address the waste transfer lines.

2.1 Piping for Which No Closure Activities will be Conducted

2.1.1 Abandoned Waste Transfer Lines for Which No Closure Activities will be Conducted

Recent archive searches conducted since preparation of EDF-4046, “Voluntary Consent Order SITE-TANK-005 Tank System INTEC-601 – Waste Transfer Lines from CPP-601 to the Tank Farm Facility,” have revealed evidence that the two abandoned waste transfer lines (3” PWA-2401Y and 3” PWA-2297Y) were adequately flushed prior to being isolated. These two waste transfer lines were abandoned in 1982 following upgrade of the CPP-601 waste discharge piping to meet HWMA/RCRA secondary containment requirements. The portions of the abandoned lines 3” PWA-2297Y and 3” PWA-2401Y that are addressed as part of this closure plan, but for which no closure activities will be conducted, are identified in Table 1 and shown on Figures 4 and 5.

Table 1. Abandoned Piping from CPP-601 to the TFF.

Piping Identification	Origin	Terminus	Length (ft) (approximately)
3” PWA-2297Y	Cap located underneath the vent tunnel in CPP-601	WM-178 Airlift Pit (Currently capped in the ground previous to the WM-178 Airlift Pit)	302
3” PWA-2297Y	Portion re-used as part of the secondary containment for line 2” PU-AR-104853 that penetrates through the U-Cell wall		5
3” PWA-2401Y	Cap located underneath the vent tunnel in CPP-601	WM-178 Airlift Pit (Currently capped in the ground previous to the WM-178 Airlift Pit)	341
3” PWA-2401Y	Capped portion that penetrates through the Y-Cell wall		5

The two 3-in. abandoned waste lines are vitreous, tile- and concrete encased, stainless steel pipes (see Figure 2). These abandoned waste lines have been cut and capped in multiple locations in the yard between CPP-601 and the TFF to facilitate construction and installation of the new RCRA compliant lines (2” PU-AR-104853 and 2” PU-AR-414854). Complete documentation on the number and location of each cut and cap is not available. The cutting and capping activities that were completed as part of the isolation work would have been performed as hands-on work, which means that the radiation fields associated with these pipes were reduced to allow personnel access to conduct work.

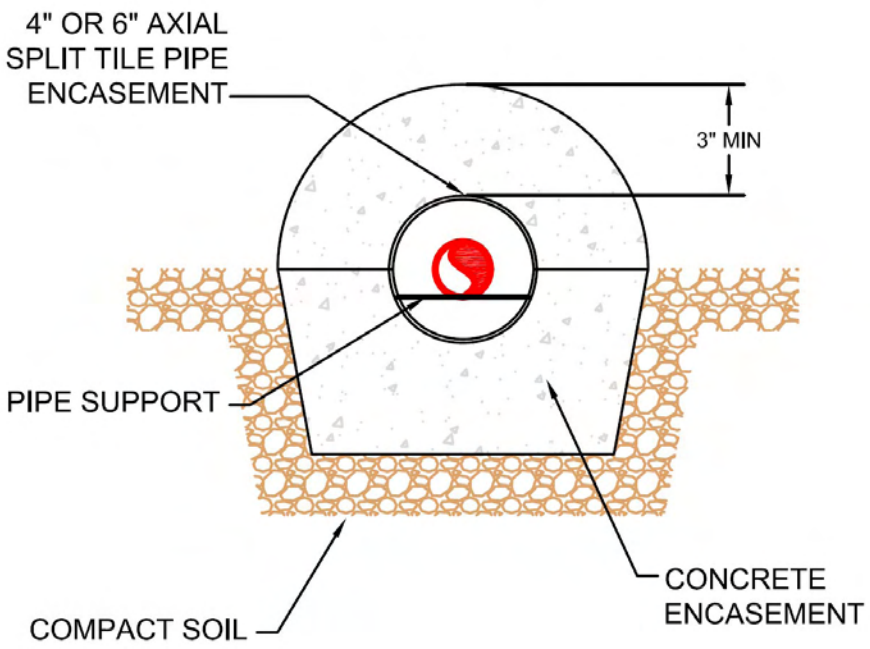

Figure 2. Detail of tile-encased stainless steel waste discharge piping.

All isolation work involved in abandoning a vessel or piping associated with the INTEC fuel reprocessing activities was done by hands-on methods, so an extensive decontamination of the equipment was required. The decontamination of the stainless steel is a multiple step process. Stainless steel

produces a hard, chemically resistant surface layer of mixed iron and chromium oxides. The first series of flushes was designed to remove this oxide layer by utilizing a strong caustic solution to break down the oxides. The next series of flushes were designed to remove the exposed base metal (i.e., stainless steel) and was accomplished by utilizing corrosive solutions and/or chelating agents. The chemical decontamination cycle was completed with nitric acid flushes to restore the oxide layer.

Sampling of the flush solutions for radionuclides tracked the progress of the chemical decontamination process. When the amount of radionuclides removed during the decontamination flushes diminished, another decontamination cycle was initiated using a different mix of chemicals. The decontamination process would continue until the radiation fields associated with the lines and/or vessels were sufficiently reduced to allow personnel access for subsequent work activities. From a historical perspective, more than 120 vessels located within CPP-601 were decontaminated using the above methodology.

As proof of the success of the decontamination methodology implemented as part of the INTEC fuel reprocessing activities, dissolver vessel VES-E-151 located in CPP-601 would have had contact radiation readings in excess of 1,000 rem/hr during fuel reprocessing operations. When emptied of process solution and rinsed with water, radiation fields over 100 rem/hr would still be expected. After chemical decontamination, flushing, and emptying, the dissolver vessel now reads approximately 0.1 rem/hr (INEEL 1999).

Table 2 summarizes historical Tank Farm Facility (TFF) Monthly Volume Reports that contain indirect references to the construction activities to replace the tile-encased waste discharge piping (3” PWA-2297Y and 3” PWA-2401Y) with RCRA compliant piping (EINCO 1982). The decontamination activities associated with the abandoned lines were completed to reduce the radiological exposure in the vicinity of the pipes to acceptable levels to allow work to continue for the installation of the new waste discharge lines (2” PU-AR-104853 and 2” PU-AR-414854).

Table 2. TFF Monthly Volume Report Summarizing Decontamination Activities associated with the Replacement of Lines 3" PWA-2297Y and 3" PWA-2401Y.

Date	Activity	Decontamination Flush Volume/Source	Comments
April 1982	TFF receipt of solutions from CPP-601	528 gal (U-Cell) 528 gal (Y-Cell)	Solutions represent planned production department flush of lines 3” PWA-2297Y and 3” PWA-2401Y to allow construction activities for replacement lines to commence.
April 1982	First-cycle decontamination solutions	29,850 gal (G-Cell)	Monthly reports indicated that decontamination activities of the CPP-601 first-cycle cells (G- and H-Cells) were still generating solutions with radiological fields too high for receipt in the PEWE system, requiring extended use of line 3” PWA-2297Y and preventing construction work near the line.
May 1982	First-cycle decontamination solutions	6,600 gal (G-Cell)	Continued decontamination activities of the CPP-601 first-cycle cells (G- and H-Cells) see comment above, requiring extended use of line 3” PWA-2297Y and preventing construction work near the line.

Table 2. (continued).

Date	Activity	Decontamination Flush Volume/Source	Comments
August 1982	TFF receipt of solutions from CPP-601	5,019 gal (U- and Y-Cells)	Represent final production department flushes through lines 3” PWA-2297Y and 3” PWA-2401Y, which allowed lines to be cut and capped.
August 1982	Final cutting and capping of lines 3” PWA-2297Y and 3” PWA-2401Y	–	Flushing activities reduced radiological fields sufficiently to allow hands-on work associated with cutting and capping lines 3” PWA-2297Y and 3” PWA-2401Y.
August/ September 1982	System operability test liquids and resumption of CPP-601 process activity	2,113 gal (G-Cell and U-Cell)	Systems operability test liquid for the new waste discharge lines. First recorded use of line 2” PU-AR-104853 or 2” PU-AR-104854.

The TFF Volume Tables for April 1982 records the receipt of 528 gal of liquid from the U-Cell and 528 gal of liquid from the Y-Cell. As the processes contained within these cells were idle at this time, these transfers represent the planned flushes for lines 3” PWA-2297Y and 3” PWA-2401Y prior to turnover to construction. A 528-gal flush represents approximately four lines volumes for 350 feet of 3-in. pipe. However, the decontamination of the first-cycle cells in CPP-601 (G- and H-Cells) was still generating solutions too radiologically contaminated for the Process Equipment Waste Evaporator (PEWE) system to receive. This required the extended use of line 3" PWA-2297Y for decontamination purposes and prevented construction work from beginning.

Construction work on the line replacement project slipped for two months while additional decontamination transfers were made to the TFF from G-Cell via line 3" PWA-2297Y. The monthly reports show 29,850 gal were transferred in April and 6,600 gal in May. In August 1982, the TFF Volume Tables identified receipt of 5,019 gal of liquid from both the U- and Y-cells. These represent the flushes that preceded the construction work which involved hands-on cutting and capping of lines 3” PWA-2297Y and 3” PWA-2401Y. The construction project was completed in August of 1982, when the monthly report records the system operability test for the new waste discharge lines (2” PU-AR-104853 and 2” PU-AR-104854).

No releases were ever identified from abandoned lines 3” PWA-2297Y and 3” PWA-2401Y. The vitrified tile and concrete encasements were designed to drain directly to the WM-178 airlift pit. No process leaks were ever detected in the WM-178 airlift pit or in the VES-WM-100 vault that lies beneath the airlift pit. This represents primary evidence that the two abandoned waste transfer lines remained intact throughout their service life. Additionally, these lines have been cut in multiple locations in the yard between CPP-601 and the TFF. During installation of the new transfer lines and subsequent excavation activities in the yard, soils with significantly elevated radiological readings were not observed, as would be anticipated if the lines had leaked.

Additional evidence that the above-described flushing activities would have successfully removed the HWMA/RCRA-regulated constituents was gained through similar activities performed by the VCO Program. In May 2005, the VCO Program removed the residual water/raffinate (approximately 24 gal) identified in EDF-4046 from lines between the H-Cell and the U-Cell (2” UWA-211, 2” UWA-212, and 2” UWA 213) as an interim action and pre-closure activity. Prior to removal of the residual water/raffinate, radiological readings for the lines in both the H- and U-Cells were approximately 10 R/hr. Following line draining and flushing, the radiological readings dropped to approximately 100 mR/hr. During this activity, each of the lines was flushed with approximately 70 – 75 gal of water. As part of the

final flushing activity, samples of the flush solution were obtained for screening analysis to determine the effectiveness of the flushing. Samples were analyzed for both radiological and HWMA/RCRA metals. HWMA/RCRA analytical results are summarized in Table 3.

Table 3. Analytical Results for 2005 Piping Flushes from H-Cell to U-Cell.

Piping Identification	Analyte	Concentration (ug/L)	Closure Action Level (ug/L)
2" UWA-211	Arsenic	ND	3,000
	Barium	11.8	59,000
	Cadmium	363	590
	Chromium	3.40	3,000
	Lead	ND	3,000
	Mercury	7.20	120
	Nickel	35.1	89,000
	Selenium	ND	590
	Silver	ND	3,000
2" UWA-212	Arsenic	ND	3,000
	Barium	24.3	59,000
	Cadmium	434	590
	Chromium	70.4	3,000
	Lead	ND	3,000
	Mercury	32.7	120
	Nickel	84.1	89,000
	Selenium	ND	590
	Silver	ND	3,000
2" UWA-213	Arsenic	16.4	3,000
	Barium	8.10	59,000
	Cadmium	12.2	590
	Chromium	206	3,000
	Lead	14.6	3,000
	Mercury	96.1	120
	Nickel	196	89,000
	Selenium	ND	590
	Silver	ND	3,000

As can be seen in Table 3, the resulting concentrations of RCRA constituents in the final flush water from the raffinate lines are below the corresponding site-specific action levels identified in Section 5 of this closure plan. Based on the physical configuration of the H- to U-Cell lines, the residual water/raffinate remaining in these lines is representative of the final solutions that would have been discharged to the TFF through the abandoned lines. Therefore, it is assumed that the flushing activities associated with the abandoned TFF discharge lines would have resulted in comparable reductions in HWMA/RCRA-regulated constituents.

Based on the information presented above regarding flushing activities and potential releases, no further HWMA/RCRA closure activities will be conducted for abandoned lines 3" PWA-2401Y and 3" PWA-2297Y.

2.1.2 Additional Piping for Which No Closure Activities will be Conducted

As stated previously, the reprocessing mission for CPP-601 was terminated in April 1992 and the last first-cycle processing campaign for FDP fuel terminated in 1988. Fuel reprocessing equipment located in CPP-601 was then extensively chemically decontaminated to prepare for worker access to the process cells. A final series of flushes, which included one dilute nitric and three water rinses, was then completed. The final flush solutions were collected (multiple units and associated piping combined) and sampled to ensure that no RCRA-hazardous waste was left in the system. A summary of the 1993-1994 flushing activities related to discharges via line 1" PW-AF-8830 is provided in Table 4. The lines decontaminated as part of the flush activities associated with the E- and G-Cell included line 1" PS-AR-107694, 1" PW-AF-8830 (portion inside the CPP-601 service corridor), and 1" PE-AF-8433 (see Figure 3); as well as G-Cell jet discharge lines 2" PWA-314 and 2" PWA-316.

Table 4. Summary of Activities Associated with E- and G-Cell Flushes and Discharges via Lines 1" PS-AR-107694 and 1" PW-AF-8830.

Date	Activity	Associated Flush Volume/Source	Comments
May 1993	E Cell Flush, Special Procedure No.: PSM-105-93	~686 gal dilute nitric acid and 132 gal deionized water	The purpose of this procedure was to remove any residual uranium.
February 1994	G-Cell Flush, Special Procedure No.: PSM-18-94	3,700 gal (925 gal dilute nitric acid, 3 x 925 gal deionized water)	The purpose of this procedure was the removal of RCRA hazardous constituents.

Phase-out activities for of the FDP located in CPP-666 were conducted in 1993–1994. As part of the FDP phaseout process, FDP equipment flushing solutions were collected in the product transfer vessel (VES-FC-147; part of VCO tank system INTEC-061) and discharged through line 1" PW-AF-8830 (1" PW-AI-128830) to CPP-601(see Figure 3). The final flushing activity associated with the FDP phaseout process discharged approximately 1,951 gal of nonhazardous solutions through 1" PW-AF-8830. Also, in 1994 when the FDP tanks FA-141 and FA-142 underwent HWMA/RCRA closure, nonhazardous decontamination solutions were discharged from the tanks FA-141 and FA-142 through line 1½" PE-AF-8433 to the deep tanks (see Figure 3).

The flushing activities described above adequately decontaminated these lines. Therefore, no further HWMA/RCRA closure activities will be conducted for lines 2" PWA-314, 2" PWA-316, 1" PS-AR-107694, 1" PW-AF-8830, and 1" PE-AF-8433 (see Figure 3).

2.2 Closure Boundaries

As identified in the *Voluntary Consent Order SITE-TANK-005 Combined System Identification and Characterization for the Uranium Dissolution and Extraction Process at the Idaho Nuclear Technology and Engineering Center* (INEEL 2002) and VCO EDF-4046, "Voluntary Consent Order SITE-TANK-005 Tank System INTEC-601 – Waste Transfer Lines from CPP-601 to the Tank Farm Facility," VCO units located within CPP-601 discharged waste solutions to the TFF. The process units within CPP-601 that discharged wastes to the TFF via the waste lines addressed in this closure plan are located in the H-, G-, U-, and Y-Cells of CPP-601 (see Figures 3 and 5). Table 5 lists the waste transfer lines associated with CPP-601 that are addressed in this closure plan.

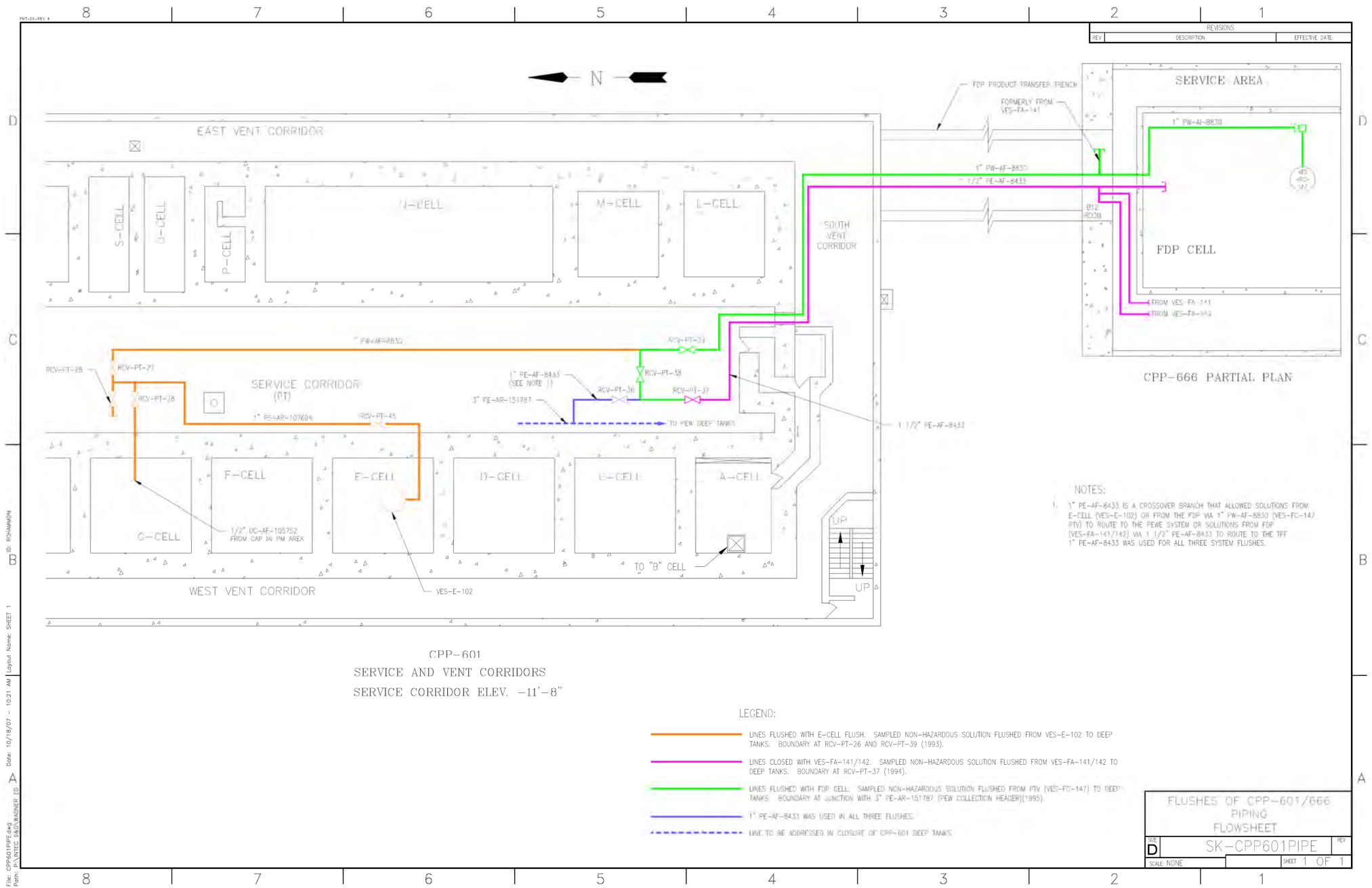

Figure 3. Schematic SK-CPP601PIPE. Overview of CPP-601/666 piping flushes.

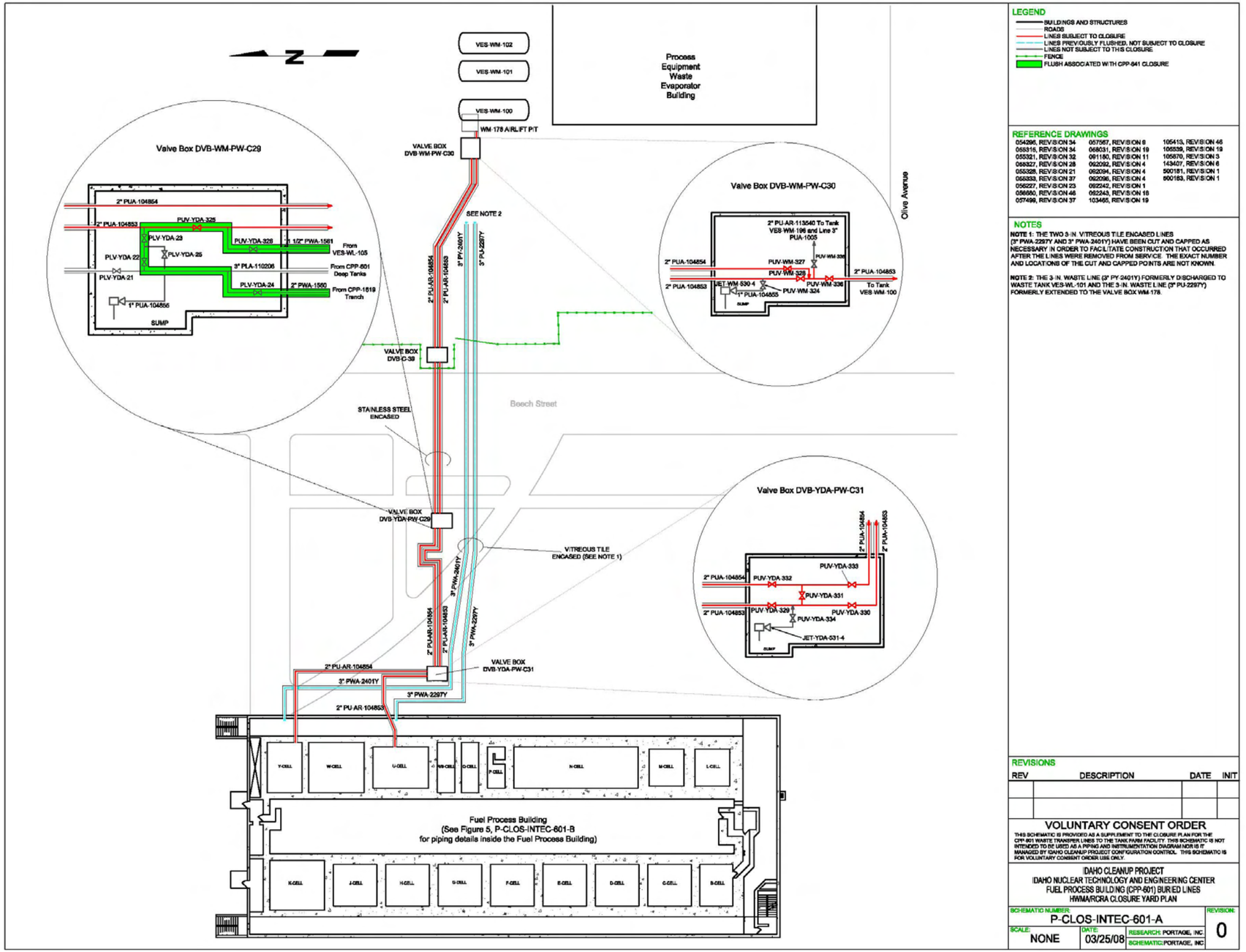

Figure 4. Schematic P-CLOS-INTEC-601-A. HWMA/RCRA closure yard schematic.

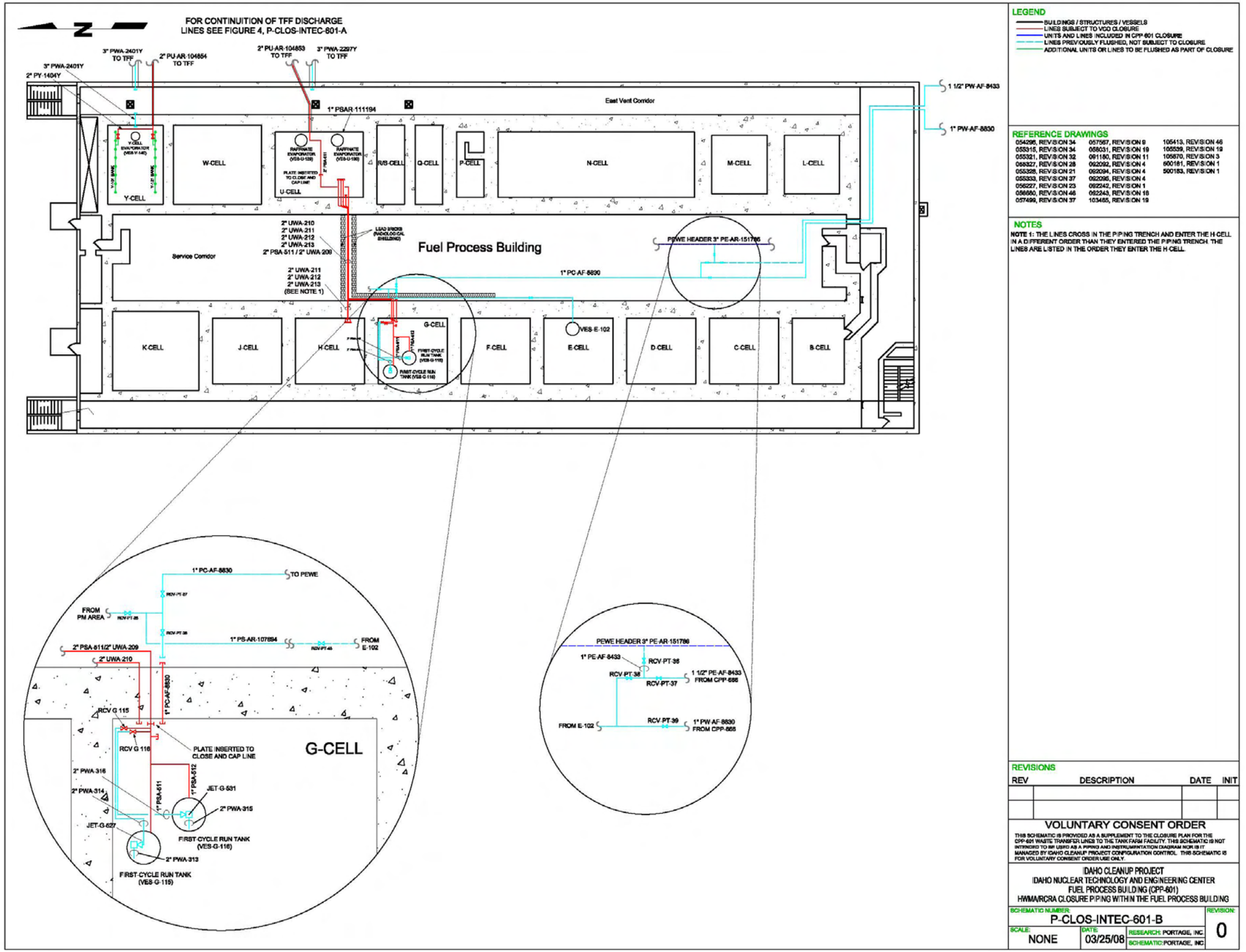

Figure 5. Schematic P-CLOS-INTEC-601-B. HWMA/RCRA piping within the Fuel Process Building.

Table 5. CPP-601 Waste Transfer Lines Subject to HWMA/RCRA Closure Actions.

Piping Identification[a]	Origin	Terminus	Estimated Length (ft)	Estimated Maximum Volume (gal)
Current Discharge Piping from CPP-601 to the TFF (see Figure 4)				
2” PU-AR-104854[b] (2” PUA-104854)	2” PY-1404Y	Connection with VES-WM-100	358	62
2” PU-AR-104853[b] (2” PUA-104853)	2” PSA-511	Connection with VES-WM-100	325	57
2” PY-1404Y	Valve RCV-Y-10 and RCV-Y-20	Connection to line 2” PU-AR-104854	10	2
Piping from the G-Cell to the U-Cell (see Figure 5)				
1” PSA-511	VES-G-115	2” PSA-511	15	<1
1” PSA-512	VES-G-116	1” PSA-511	8	<1
2” PSA-511/2” UWA-209	1” PSA-511	2” PU-AR-104853	85	15
2” UWA-210	Cap in the G-Cell	Cap in the U-Cell	50	9
Piping from the H-Cell to the U-Cell (see Figure 5)				
2” UWA-211	Cap in H-Cell	Cap in U-Cell	45	8
2” UWA-212	Cap in H-Cell	Cap in U-Cell	45	8
2” UWA-213	Cap in H-Cell	Cap in U-Cell	45	8
Piping from G-Cell (see Figure 5)				
1” PC-AF-8830	Cap in G-Cell	Cap outside G-Cell	5	<1

a. Line numbers within CPP-601 changed frequently. Most notably, line numbers change between process cells. This system of numbering was put in place at construction of the facility to enhance security of the facility.

b. Lines 2” PU-AR-104853 and 2” PU-AR-104854 are addressed as part of the *RCRA Partial Permit for HWMA Storage and Treatment for the Liquid Waste Management System at the Idaho Nuclear Technology and Engineering Center on the Idaho National Laboratory* (State of Idaho 2007).

3. MAXIMUM WASTE INVENTORIES AND CHARACTERISTICS

The waste discharge piping associated with the CPP-601 uranium dissolution and extraction process was designed to gravity drain; only residual liquids are expected to remain in the piping. The only lines (2" UWA-211, 2" UWA-212, and 2" UWA-213 from the H-Cell to the U-Cell) known to have contained liquids (24 gal) were drained and rinsed in spring 2005.

The total estimated maximum volume of the piping (Table 5) is approximately 172 gal. Wastes transferred via the waste transfer piping addressed in this closure plan included process wastes without recoverable amounts of uranium and decontamination solutions. Process wastes could have exhibited the toxicity characteristic for cadmium (EPA HWN D006) and mercury (EPA HWN D009), and the characteristic of corrosivity (EPA HWN D002). No listed wastes are associated with the waste transfer lines addressed in this closure plan.

4. CLOSURE PERFORMANCE STANDARDS

This section describes the performance standards for closure of the waste transfer piping (IDAPA 58.01.05.009 [40 CFR 265.111 and 265.197]) and the procedures for meeting the closure performance standards.

4.1 Regulatory Closure Performance Standards

The closure performance standards identified in IDAPA 58.01.05.009 (40 CFR 265.111 and 265.197) applicable to the waste transfer piping addressed in this closure are:

Standard 1: The owner or operator must close the facility in a manner that minimizes the need for further maintenance (IDAPA 58.01.05.009 [40 CFR 265.111(a)]).

Standard 2: The owner or operator must close the facility in a manner that controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere (IDAPA 58.01.05.009 [40 CFR 265.111(b)]).

Standard 3: The owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste, and properly manage all hazardous wastes generated during closure activities (IDAPA 58.01.05.009 [40 CFR 265.197(a)][b]).

4.2 Activities for Achieving the Closure Performance Standards

The closure and waste management activities to be conducted under HWMA/RCRA closure are described in detail in Section 5 of this closure plan for each of the subunits undergoing closure. The closure performance standards will be achieved by the following measures:

b. There are no tanks to be closed in this closure plan for the CPP-601 waste transfer lines to the TFF; however, the piping was identified during characterization as ancillary tank system equipment and, as such, 40 CFR 265.197 is applicable.

4.2.1 Standard 1

Standard 1: The owner or operator must close the facility in a manner that minimizes the need for further maintenance (IDAPA 58.01.05.009 [40 CFR 265.111(a)]).

1. The waste transfer piping will be decontaminated as specified in Section 5.2 of this HWMA/RCRA closure plan.

4.2.2 Standard 2

Standard 2: The owner or operator must close the facility in a manner that controls, minimizes or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere (IDAPA 58.01.05.009 [40 CFR 265.111(b)]).

1. The waste transfer piping will be decontaminated as specified in Section 5.2 of this HWMA/RCRA closure plan.

4.2.3 Standard 3

Standard 3: At closure of a tank system, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste, and manage them as hazardous waste, unless §261.3(d) of this Chapter (CFR Title 40) applies. The closure plan, closure activities, cost estimates for closure, and financial responsibility for the tank systems must meet all of the requirements specified in subparts G and H of this part (IDAPA 58.01.05.009 [40 CFR 265.197(a)] [c]).

1. The waste transfer piping will be decontaminated as specified in Section 5.2 of this HWMA/RCRA closure plan.

2. All system components for which HWMA/RCRA closure activities will be conducted are located within Building CPP-601 with the exception of lines 2” PU-AR-104853 and 2” PU-AR-104854, which are secondarily contained. There are no documented releases of waste to the secondary containment. Therefore, no actions with regard to the secondary containment will be conducted as part of HWMA/RCRA closure activities for these lines.

   Piping within Building CPP-601 is located within the process cells and corridors of the Fuel Process Building. These cells and corridors are stainless-steel-lined or coated with epoxy paint and are part of the secondary containment system for the CPP-601 deep tanks, which are included in the Part B Permit for the ILWMS (State of Idaho 2007). Therefore, no actions with regard to secondary containment of the piping within CPP-601 will be taken as part of this HWMA/RCRA closure activity.

c. There are no tanks to be closed in this closure plan for the CPP-601 waste transfer lines to the TFF; however, the piping was identified during characterization as ancillary tank system equipment and, as such, 40 CFR 265.197 is applicable.

5. CLOSURE ACTIVITIES

This closure plan describes the methods for closing the waste transfer lines per the requirements of IDAPA 58.01.05.009 (40 CFR 265, Subparts G and J). The waste transfer lines will be closed by decontamination and compliance with the performance standards will be demonstrated by either sampling of the final rinsate solutions from the decontamination efforts and comparing the resulting analytical data with the site-specific ALs provided in Table 6, or physical/abrasive decontamination techniques coupled with visual inspection. These ALs were developed to ensure that the waste piping, subsequent to completion of closure activities, will be left in a state that is protective of human health and the environment.

Wastes discharged to the lines included process wastes and decontamination solutions. Final chemical decontamination activities for the uranium dissolution and extraction process consisted of a flush with dilute nitric acid followed by three flushes with demineralized water. As such, water will be used as the decontamination solution for all closure activities. Water is also representative of the fluid that may come in contact with the lines during post-closure. Process knowledge from the operation of the system indicates that the HWMA/RCRA contaminants of concern (COCs) are barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc. To be conservative, ALs were calculated for the Target Analyte List metals listed in Table 6.

Table 6. Site-Specific ALs for Closure of the CPP-601 Waste Transfer Lines.

Contaminant of Concern	Action Level (mg/L)	Contaminant of Concern	Action Level (mg/L)
Antimony	8.9E+01	Mercury	1.2E–01
Arsenic	3.0E+00	Nickel	8.9E+01
Barium	5.9E+01	Selenium	5.9E–01
Beryllium	3.9E+01	Silver	3.0E+00
Cadmium	5.9E–01	Thallium	6.6E+01
Chromium	3.0E+00	Vanadium	8.9E+01
Lead	3.0E+00	Zinc	8.9E+01

The following subsections describe the closure activities to be completed, waste management activities, and required closure documentation to ensure the tank system closure performance standards are satisfied.

5.1 Removal of Hazardous Waste Inventory

The waste transfer lines between the H- and U-Cells in CPP-601 were drained of all remaining liquids in 2005 as part of a VCO interim action (see Subsection 2.1.1). Approximately 24 gal of liquid waste were removed. The remaining lines between CPP-601 and the TFF contain only waste residuals. Additional residual waste, if any, remaining in the piping to be decontaminated will be removed during initial decontamination of the piping. No specific waste removal activities will be conducted as part of closure activities.

5.2 Decontamination of Waste Piping

Since it has been determined that removal of the waste transfer piping is impractical, all the waste piping identified in Table 5 will be decontaminated either through sampling of the final rinsate solutions from the decontamination efforts and comparing the resulting analytical data with the site-specific ALs provided in Table 6, or physical/abrasive techniques coupled with a visual inspection (see Subsection 5.2.2).

5.2.1 Decontamination of Waste Piping

The waste piping will be decontaminated by flushing the piping with water and collecting samples in accordance with the sampling procedure associated with this closure plan (SPR-178). A minimum of one volume of water will be flushed through each line to ensure the internal piping surfaces that contacted hazardous waste are decontaminated. Following decontamination, final rinsate samples will be collected to demonstrate that the site-specific ALs specified in this closure plan are met.

For purposes of decontamination activities and certification sampling, piping subject to closure has been grouped into subunits based on the physical configuration of the piping (see Table 7). Each subunit will be decontaminated and final rinsate solutions collected from the subunit. As part of decontamination activities other piping and units within CPP-601 (not included in this closure) will be used for introduction of the flush solution and for collection of rinsates. The final rinsate samples collected for the subunit will be used to verify that the concentrations of COCs in the rinsate from each line included in the subunit, as well as other piping used during decontamination activities, meet the site-specific ALs specified in Table 6. Once the ALs have been met, no further closure actions will be required.

Table 7. CPP-601 Decontamination and Sampling Subunits.

Subunit 1 – Current Discharge Piping from CPP-601 to the TFF (see Figures 4 and 5)
2” PU-AR-104854
2” PU-AR-104853
2” PY-1404Y
2” PSA-511[a]
Subunit 2 – G-Cell Piping (see Figure 5)
1” PSA-511
1” PSA-512
2” PSA-511[a]
Subunit 3 – Piping from the H-Cell to the U-Cell (see Figure 5)
2” UWA-211
2” UWA-212
2” UWA-213
Subunit 4 – Piping from the G-Cell to the U-Cell (see Figure 5)
2” UWA-210
2” PSA-511[a]

a. Line 2” PSA-511 will be flushed as part of three subunits. Approximately 5 ft of the line is located within the G-Cell, 50 ft of the line is located under the Service Corridor floor, and 30 ft of the line is located in the U-Cell.

5.2.2 Decontamination of Lines 2” PU-AR-104853 and 2” PU-AR-104854

A portion of waste transfer lines 2” PU-AR-104853 and 2” PU-AR-104854 associated with Subunit 1 will be decontaminated by flushing the lines with water and collecting samples in accordance with the sampling procedure associated with this closure plan (SPR-178). However, the deteriorating condition of many of the valves located in the TFF limits the ability to manipulate these valves (i.e., open and close) and collect samples. Therefore, a portion of the Subunit 1 piping will be flushed based on the quantity of the flush water that has been demonstrated to adequately remove the COCs from a similar portion of the waste discharge lines.

Decontamination water will be introduced into line 2” PU-AR-104853 via 2” PSA-511 located inside U-Cell. The water will be flushed through line 2” PU-AR-104853 into valve box DVB-YDA-PW-C31 and diverted through a cross tie (through valve PUV-YDA-331) into line 2” PU-AR-104854 (both valves PUV-YDA-330 and -333 will be closed). The flush water will be collected in Y-Cell via 2” PY-1404Y for sample purposes. Sample results will demonstrate that the quantity of flush water per linear foot of line was sufficient to achieve site-specific actions levels specified in Table 6. The portion of line 2” PU-AR-104854 located downstream of valve PUV-YDA-333 (located in valve box DVB-YDA-PW-C31) will be filled and flushed with decontamination water until the equivalent quantity of flush water has been discharged through this section of line.

A portion of Subunit 1 piping (2” PU-AR-104853) was also used to transfer waste solutions from the CPP-641 Westside Waste Holdup Tank System (DOE-ID 2008). The input from CPP-641 was introduced into line 2” PU-AR-104853 in valve box DVD-YDA-PW-C29 (see Figure 4). As part of the HWMA/RCRA closure actions associated with the CPP-641 tank system, decontamination water will be flushed through a portion of 2” PU-AR-104853 and sampled. Successful decontamination will be achieved when sample results verify that the site-specific actions levels for the COCs associated with CPP-641 (DOE-ID 2008) have been achieved. The portion of line 2” PU-AR-104853 located downstream of valve PUV-YDA-330 (located in valve box DVB-YDA-PW-C31) will be filled and flushed with decontamination water until an equivalent quantity of flush waste has been discharged through this section of line. An equivalent quantity of decontamination water will be based on the amount of flush water per linear foot of line that was necessary to achieve the site-specific action levels specified in Table 6 or in the CPP-641 closure plan (DOE-ID 2008), whichever is deemed larger.

Once sufficient decontamination solutions have been flushed through lines 2” PU-AR-104853 (portion downstream of valve PUV-YDA-330) and 2” PU-AR-104854 (portion downstream of valve PUA-YDA-333) to VES-WM-100, no further closure actions will be required.

5.2.3 Decontamination of Line 1” PC-AF-8830

Line 1” PC-AF-8830 is a short embedded piping stub that runs through the G-Cell wall to the Service Corridor of CPP-601 (see Figure 5). This line will be decontaminated using physical/abrasive techniques (e.g., scrubbing and scouring) and visually inspected to ensure no waste-related residue remains. Because this line can be visually inspected, it is unnecessary to define ALs for this line. The performance standard criteria for decontamination of the internal surfaces of the line will be decontamination to remove visible residue. Visible waste residue will be considered removed when the remaining residue is less than 5% of the volume of any 1-ft piping length.

5.3 Waste Management

As required by IDAPA 58.01.05.009 (40 CFR 265.114), contaminated equipment (that will be managed as waste) must be properly disposed of or decontaminated in accordance with applicable requirements. Waste generated during closure activities may include nonhazardous industrial waste, HWMA/RCRA-hazardous waste, and mixed hazardous waste. All closure-generated wastes will undergo a hazardous waste determination in accordance with IDAPA 58.01.05.006 (40 CFR 262.11). All hazardous waste will be managed in accordance with the generator requirements of IDAPA 58.01.05.006 (40 CFR 262) and will be disposed of appropriately (e.g., RCRA-hazardous waste transferred to/disposed of at a RCRA-permitted treatment, storage, and disposal facility). Information regarding waste management during closure activities will be provided to the independent qualified professional engineer for closure certification and will be maintained as part of the project file.

5.4 Closure Documentation

Closure activities will be monitored and reviewed by an independent qualified professional engineer. Following successful completion of closure activities, the professional engineer will certify that closure was performed in accordance with the DEQ-approved closure plan. Information related to successful implementation of closure activities will be recorded or documented and provided to the professional engineer, as requested, to support closure certification. Successful demonstration of achieving the closure performance standards may require documentation of the decontamination of waste piping, including procedures, work orders, validated sampling data, and data quality assessment report(s), as appropriate.

6. CLOSURE SCHEDULE

Table 8 identifies the closure schedule that will be initiated following DEQ approval of this closure plan. This schedule reflects the time required for conducting closure activities and submitting information to the independent qualified professional engineer for certification. IDAPA 58.01.05.009 (40 CFR 265.113) requires waste removal activities be completed 90 days from the approval of the closure plan and closure to be completed within 180 days from the initiation of closure activities.

Table 8. Closure Schedule for the CPP-601 Waste Transfer Lines.

Activity	Completion
DEQ approval of closure plan	Day 0
Flushing of CPP-601 in-cell piping (Subunits 2, 3, and 4) and current discharge piping from CPP-601 to the TFF (Subunit 1)	Day 90
• Decontamination of the lines	
• Final rinsate sampling	
Complete physical/abrasive decontamination of line 1" PC-AF-8830	Day 90
Obtain sample results of final rinsate solutions, compare to ALs, and complete closure activities	Day 180
Professional engineer and owner/operator certification submitted to DEQ	Day 240

7. CLOSURE PLAN AMENDMENTS

The conditions described in IDAPA 58.01.05.009 (40 CFR 265.112), "Closure Plan; Amendment of Plan," will be followed to implement changes to the approved closure plan. Should unexpected events during the closure period require modification of the approved closure activities or closure schedule, the closure plan will be amended or the DEQ will be otherwise notified within 30 days of the unexpected event. A written request detailing the proposed changes and the rationale for those changes and a copy of the amended closure plan will be submitted to DEQ for approval, as necessary. Minor changes to the approved closure plan, which are equivalent to or do not compromise the closure requirements and performance standards identified in the approved closure plan, may be made without prior notification to DEQ. Minor changes will be identified in the documentation supporting the independent qualified professional engineer's certification.

8. CERTIFICATION OF CLOSURE

Within 60 days of completing the closure activities, a certification of closure of the CPP-601 waste transfer lines to the TFF will be provided, in accordance with IDAPA 58.01.05.009 (40 CFR 265.115), by a qualified professional engineer and the DOE Idaho Operations Office. The professional engineer and owner/operator signatures on the closure certification will be submitted as a milestone deliverable under Subsection 9.8 of the VCO. The professional engineer and owner/operator signatures on the closure certification, which is submitted to the DEQ, will document the completion of closure activities in accordance with the approved closure plan and State of Idaho HWMA/RCRA requirements. The closure certification may also identify any minor changes to the closure plan made without prior approval of the DEQ. Closure of the waste lines will be considered complete upon receipt of written acceptance issued by the DEQ.

Copies of documentation supporting the closure of the waste lines will remain in the project files, the VCO Program files, and the ICP Environmental Affairs Administrative Records in the event that information is requested by DEQ. The system being closed is not a hazardous waste disposal facility, and therefore, a “Notice in Deed” and a survey plat are not required.

9. COST AND LIABILITY REQUIREMENTS

The federal government, as owner of the INL Site, is exempt from the requirements to provide cost estimates for closure, to provide a financial assurance mechanism for closure, and regarding state-required mechanism and state assumption of responsibility. The federal government, as owner of the INL Site, is also exempt from liability requirements.

10. REFERENCES

40 CFR 262, "Standards Applicable to Generators of Hazardous Waste," *Code of Federal Regulations*, Office of the Federal Register, as amended.

40 CFR 265, 2005, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, Office of the Federal Register, as amended.

42 USC 6901 et seq., 1976, "Resource Conservation and Recovery Act of 1976," as amended.

EDF-4046, 2003, "Voluntary Consent Order SITE-TANK-005 Tank System INTEC-601 – Waste Transfer Lines from CPP-601 to the Tank Farm Facility," Rev. 0, September 25, 2003.

EDF-4632, 2004, "Voluntary Consent Order Tank System INTEC-061 – INTEC/FAST Fluorinel Dissolution Process System – Train 1 Characterization," Rev. 1, December 9, 2004.

DOE-ID, 2008, "HWMA/RCRA Closure Plan for the CPP-641 Westside Waste Holdup Tank System," DOE/ID-11341, Revision 2, January 2008.

IDAPA 58.01.05.006, "Standards Applicable to Generators of Hazardous Waste," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality Rules, as amended.

IDAPA 58.01.05.009, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality Rules, as amended.

INEEL, 1999, *Process Description and Operating History of the CPP-601/-640/-627 Fuel Reprocessing Complex at the Idaho National Engineering and Environmental Laboratory*, INEEL/EXT-99-00400, June 1999.

INEEL, 2002, *Voluntary Consent Order SITE-TANK-005 Combined System Identification and Characterization for the Uranium Dissolution and Extraction Process at the Idaho Nuclear Technology and Engineering Center*, INEEL/EXT-2001-00225, Revision 2, February 2002.

SPR-178, 2007, "Sampling Procedure for the Closure Certification of the CPP-601 Waste Transfer Lines Voluntary Consent Order SITE-TANK-005 Action Plan," as amended.

State of Idaho, 1983, "Hazardous Waste Management," Idaho Statute, Title 39, "Health and Safety," Chapter 44, "Hazardous Waste Management" (also known as the Hazardous Waste Management Act of 1983).

State of Idaho, 2007, "Partial Permit for HWMA Storage and Treatment for the Liquid Waste Management System at the Idaho Nuclear Technology and Engineering Center on the Idaho National Laboratory," EPA ID No. ID4890008952, Effective Date: October 18, 2004, Revision Date: April 26, 2007.